

Amendments to the Drawings:

The drawing sheet attached in connection with the above-identified application containing Figure 3 is being presented as a new formal drawing sheet to be substituted for the previously submitted drawing sheet. The drawing figure 3 has been amended to change reference number '77' on the right side of the diagram to reference number '67.'

REMARKS

With the entry of the present amendments, Claims 1-17 are pending in the application. Claims 18-33 have been cancelled. Claims 1, 2 and 15 have been amended. Support for the claim amendments may be found throughout the application as filed, including but not limited to, paragraph 49.

In view of the following remarks, reconsideration and withdrawal of the rejections to the application in the Office Action is respectfully requested.

I. Information Disclosure Statement

Applicants thank the Examiner for bringing to Applicants' attention several errors in the Information Disclosure Statement submitted on August 16, 2004. Applicants have made the appropriate corrections in the accompanying Corrected Information Disclosure Statement.

II. Amendments to the Drawings and Specification

Figure 3 was objected to for using reference number 77 to identify two different structures. Reference number 77 on the right side of the drawing has been changed to reference number "67," as suggested by the Examiner. In addition, the specification has been amended such that reference numbers 76 and 77 are no longer defined by more than one term. Applicants believe these amendments to the drawings and the specification overcome the objections to Figure 3 and respectfully request that these objections be withdrawn.

III. Rejection of Claims Under 35 U.S.C. § 112, Second Paragraph

Claims 1-17 were rejected under 35 U.S.C. § 112, second paragraph, as vague and indefinite because it was unclear whether the term "the surface" referred to "a surface" or "an oxide surface." Applicants have amended claims 1 and 2 to clarify that the term "the surface" refers to the oxide surface. Applicants believe this amendment overcomes the rejection and respectfully request that it be withdrawn.

IV. Rejection of Claims under 35 U.S.C. § 103(a) over Wagner in view of Hubbell and Schössler.

Claims 1-8, 13 and 14 were rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent Application Publication No. 2002/0110932, issued to Wagner et al. (hereinafter

“Wagner”) in view of U.S. Patent Application Publication No. 2002/0128234, issued to Hubbell et al. (hereinafter “Hubbell”) and further in view of U.S. Patent No. 4,822,681, issued to Schössler et al. (hereinafter “Schössler”). Applicants respectfully traverse.

In order to establish a *prima facie* case of obviousness, three criteria must met: (1) the recited references must provide some motivation to modify the references teachings; (2) there must be a reasonable expectation of success; and (3) the resulting combination must teach or suggest all of the limitations of the rejected claims. (MPEP 2142) The references cited by the Examiner fail to provide a *prima facie* case of obviousness because they fail to teach or suggest a method of treating a surface that includes the step of reacting the hydroxyl groups on a plasma-treated surface with gas-phase epoxy-functional molecules *in situ*.

In support of the rejection, the Examiner points out that Schössler teaches the reaction of glycidoxypolytriethoxysilane with the hydroxyl groups on a hydroxyl group-containing surface and further teaches that “It is particularly advantageous to effect the activation in gaseous phase through employment of aerosols or by means of underpressure.” In making this rejection, the Examiner appears to be equating a gas-phase reaction under reduced pressure to an *in situ* gas-phase reaction. In doing so, the Examiner has overlooked a subtle, but important, difference between the combined teachings of the prior art and the presently claimed invention.

The phrase “*in situ*” is defined in paragraph 46 the present specification as “without first breaking the vacuum in the plasma reactor chamber or otherwise exposing the surface to the atmosphere.” Thus, the present claims require that the plasma-treated surface is not exposed to the atmosphere prior to reacting the surface hydroxyl groups with a gas comprising epoxy-functional molecules.

Although Wagner and Hubbell describe plasma treatments that introduce hydroxyl-functionalities on substrate surfaces, these references do not teach or suggest that the surfaces should be kept out of the atmosphere prior to any subsequent reactions of the surface functionalities. Schössler fails to cure this deficiency. As noted by the Examiner, Schössler teaches activating hydroxyl group-containing polymer surfaces and that “It is particularly advantageous to effect the activation in the gaseous phase ... by underpressure.” (See, col. 4, lines 44-47.) However, this phrase merely suggests that a reactant (e.g.,

glycidoxypropyltriethoxysilane) may be converted into a gas by reducing the pressure over the reactant, which is a liquid at room temperature. Thus, at best, Schössler suggests carrying out the reaction between a hydroxyl group-containing surface and glycidoxypropyltriethoxysilane at a reduced pressure, such that the vapor pressure of the glycidoxypropyltriethoxysilane is increased. This is not the same as teaching that the hydroxyl group-containing surface should be shielded from the atmosphere prior to the gas-phase reaction. In fact, in the examples in Schössler the surfaces are not protected from the atmosphere prior to the reaction of the hydroxyl groups. Therefore, because the combination of Wagner, Hubbell and Schössler fail to teach or suggest an *in situ* reaction between the hydroxyl groups on a plasma-treated surface and epoxy-functional molecules, these references do not provide a *prima facie* case of obviousness. For this reason, Applicants respectfully request that the rejection of claim 1 be withdrawn.

With respect to claims 4 and 5, Applicants further note that the cited references fail to teach or suggest the step of exposing a silicon oxide surface (claim 4) or a silica, glass or quartz surface (claim 5) to a plasma to form hydroxyl groups. Although Wagner makes the general statement that “plasma exposure can be used to directly activate or alter the substrate and create a coating,” Wagner does not teach or suggest using a plasma to produce hydroxyl groups on silicon oxide, silica, glass or quartz surfaces. In fact, silicon oxide and glass are cited as examples of coatings by Wagner (see paragraph 94). Because these materials *are* coatings there would be no need to expose them to a plasma to “create a coating.” The only example Wagner provides of a plasma-based method for forming a hydroxyl group-containing coating on a surface is a plasma etch of a polymer surface to expose hydroxyls. (See paragraph 92.) This teaching is insufficient to suggest the use of a plasma to create hydroxyl groups on a silicon oxide, silica, glass or quartz surface. Hubbell and Schössler also fail to teach the plasma treatment of a silicon oxide, silica, glass or quartz surface with a plasma to form hydroxyl groups. For this additional reason, Applicants respectfully request that the rejection of claims 4 and 5 be withdrawn.

V. Rejection of Claims under 35 U.S.C. § 103(a) over Wagner in view of Hubbell, Schössler and Laibinis or Devoe.

Claims 9-12 were rejected under 35 U.S.C. § 103(a) as unpatentable over Wagner in view of Hubbell, Schössler and P.C.T. Patent Application Publication No. WO 01/83826, issued to

Laibinis et al. (hereinafter “Laibinis”) or P.C.T. Patent Application Publication No. WO 01/96452, issued to Devoe et al. (hereinafter “Devoe”). Applicants respectfully traverse.

Claims 9-12 each depend from claim 1. Claim 1 is patentable over the combination of Wagner, Hubbell and Schössler for the reasons discussed in Section IV, above. Like Wagner, Hubbell and Schössler, Laibinis and Devoe also fail to teach or suggest an *in situ* reaction between a hydroxyl group-containing surface and an epoxy-functional molecule. Therefore, claims 9-12 are patentable over the cited prior art for the reasons discussed above in Section III. For this reason, Applicants respectfully request that the rejection of claims 9-12 be withdrawn.

VI. Rejection of Claims under 35 U.S.C. § 103(a) over Wagner in view of Hubbell, Schössler and Dang.

Claims 15-17 were rejected under 35 U.S.C. § 103(a) as unpatentable over Wagner in view of Hubbell, Schössler and U.S. Patent Application Publication No. 2002/0113478, issued to Dang et al. (hereinafter “Dang”). Applicants respectfully traverse.

Claims 15-17 each depend from claim 1. Claim 1 is patentable over the combination of Wagner, Hubbell and Schössler for the reasons discussed in Section IV, above. Like Wagner, Hubbell and Schössler, Dang also fails to teach or suggest an *in situ* reaction between a hydroxyl group-containing surface and an epoxy-functional molecule. Therefore, claims 15-17 are patentable over the cited prior art for the reasons discussed above in Section III. For this reason, Applicants respectfully request that the rejection of claims 15-17 be withdrawn.

With respect to claim 15, Applicants further note that the Examiner has again apparently overlooked the significance of the term “*in situ*” in the claim. Claim 15 recites a method for treating a surface that includes the step of reacting a spacer chain with a spacer molecule “*in situ* in the absence of plasma.” As discussed in Section III above, the phrase “*in situ*” is defined in paragraph 46 the present specification as “without first breaking the vacuum in the plasma reactor chamber or otherwise exposing the surface to the atmosphere.” This distinction has been highlighted by amending claim 15 to clarify that the reaction between the spacer chains and the spacer molecules takes place in the gas phase. Thus, claim 15 recites a process wherein a surface is exposed to plasma to form hydroxyl groups and, *without exposing the surface to the*

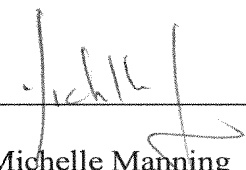
atmosphere, the hydroxyl groups are reacted with gas-phase epoxy-functional molecules to provide spacer chains and, *without exposing the surface to the atmosphere*, the spacer chains are reacted with gas-phase spacer molecules.

Dang simply fails to teach or suggest the use of an *in situ* gas-phase reaction to attach a multi-functional linker to a surface-modifying group. Therefore, Dang fails to teach or suggest every limitation of claim 15. For this additional reason, Applicants respectfully request that the rejection of claim 15 be withdrawn.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 50-2350. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 50-2350. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. §1.136 and authorizes payment of any such extensions fees to Deposit Account No. 50-2350.

Respectfully submitted,

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By 

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